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SOME OUTSTANDING FACTORS IN THE WESTERN PINE BEETLE PROBLEM

J. M. Miller, 1927?

At the present time the owner of yellow pine stumpage regards the western pine beetle as a greater menace to his financial interests than any other insect enemy of our western forests. In some regions this barkbeetle has become a strong competitor of the sawmill for the best grades of merchantable timber. Like the lumberman, it prefers to work in even-aged stands of mature pine, and accepts with reluctance mixed forests with high percentages of younger growing trees. Western pine beetle epidemics in the yellow pine belt in southern Oregon and northern California have reduced the potential lumber yield of the region during the past ten years more than any other natural agency.

The present situation, as it stands in the fall of 1927, can be covered briefly. The data now at hand indicate that the past season has brought little relief from the heavy epidemic conditions that started during the dry season of 1924 in the areas east of the Cascade and Sierra Nevada Mountains. The timber losses of 1924, which were already high, were doubled by those of 1925, and in 1926 the loss again doubled. The 1927 losses are now known to be practically as high as those of 1926, and on some areas run as high as one million board feet per section. This 1927 situation is perhaps the most disconcerting of all recent developments. With the heavy winter of 1926-27, together with the already prolomged epidemic condition of the beetles, it was hoped that natural control factors would gain the upper hand last summer and a general reduction follow. No marked tendencies indicating a decline have yet developed. The season of 1928 is the earliest in which we can hope to see any general reduction of losses through natural causes.

It should be kept in mind that the seriousness of the present situation is to a great extent localized. The heavier epidemics can easily be connected up with certain sites, types and general maturity of the stands. Many owners can regard the problem with complacency; either their holdings are free from serious damage, or else the values are so low and the ultimate market so far away that the loss of a part of the present timber cover is of small importance. But to the owner, systaining a heavy loss of forest capital upon which he hopes to realize a profit within the next few decades, the problem is something more than a field for academic research. Perhaps the two most important questions to the owner are: How long are present conditions likely to continue? What can be done to protect or salvage his timber if these barkbeetle epidemics do not die out from natural causes?

The answer to the first question will have to await a competent prophet. No one seems ready to predict the future of the existing pine beetle epidemics if nature is left to take its course. The confidence of the entomologist in theories and prophecies has been somewhat shaken by developments of the 1927 season. In general, many of our more valuable commercial pine areas contain a high percentage of mature, slow-growing trees that are highly susceptible to the attacks of this particular barkbeetle. It is doubtful if we can hope for any permanent improvement in the present situation until these trees are removed and the stand replaced by young and more vigorous growth. To the federal or private owner who plans to practise forestry on a systained-yield basis this is the most obvious and attractive solution, and the barkbeetle factor will undoubtedly be given due consideration in the future management of these pine forests. But to the private owner who has invested his working capital

in stumpage values as they now stand, this sort of a remedy offers no encouragement whatever.

What then are the possibilities of meeting the situation that confront the owner who hopes to market the present virgin crop of trees before they are harvested by his little competitor, the barkbeetle? We have come to regard the effects of certain natural disasters, like windfalls, drought and lightning, as unwelcome but inevitable acts of providence. We accept these problems as we do the weather--something to be studied as well as talked about; but, as a great humorist remarked years ago, no one does anything about the weather! However, man is now doing something toward combating forest fires and has undertaken the control of certain forest pests and diseases. What can he hope to do toward meeting a threat like that of the western pine beetle?

Aside from letting nature take its course, which we have already considered as offering little hope in the more susceptible timber, two other alternatives seem possible. These are (1) direct control work and (2) selective logging.

Aside from these two proposed remedies the only possibilities seem to depend upon further progress in research work, which may uncover new factors in the problem.

With the methods now available, direct control measures can be counted upon to reduce losses, but are practicable only under special conditions. Our present control strategy involves fairly comprehensive projects over large acreages, usually where the cooperation of a large number of owners is necessary. Very seldom can a project be carried out without the support of federal agencies, whose appropriations for this work are limited and uncertain. The work is expensive, and is profitable

only where timber values are relatively high. Furthermore, the results are transient, and the work must be kept up whenever the infestation becomes aggressive. However, control work has proven profitable in a number of instances. One timber company that kept its control work going through the epidemic period of 1924 to 1927, held its annual losses down to 200 trees per section, while on similar areas not treated the annual loss ran close to 1000 trees per section. This work was carried on against an increasing epidemic and represents a substantial saving

Selective logging offers the possibility of salvaging the more recent losses and bringing the stand into a more resistant condition by taking out the more susceptible trees. The object of this method is to unload the highest risks as fast as possible. It would involve logging in the heavily infested centers first, and extending the operation where the most good can be accomplished by taking out the larger, slow-growing trees, leaving the thrifty individuals and younger trees to be taken at a more convenient time. From an entomological standpoint this appears to be an obvious though untried solution, but from the operator's viewpoint there will be many factors to consider. Accessibility, stumpage values, percent of stand to be cut and current market conditions, would all have to be counted in figuring the margin of profit or loss of any operation. Moreover, this proposed remedy can be applied only by the owner who is in a position to operate immediately, and no doubt he would prefer to see the method given a tryout by some other owner before going into it on any comprehensive scale.

Aside from the alternatives suggested, what help can be expected from a well-planned research program? Obviously any contemplated results from research work are an unknown quantity, and we can only speculate as

to ultimate accomplishments. The objectives of research work, however, can be defined, and among them the two following seem paramount:

1. Determination of the biological and climatic factors that enter into the natural control of the barkbeetle;

2. Improvement of present control methods and development of new ones by experimental projects.

The influence of parasites, predatory insects and birds should be more definitely known. It is doubtful if these agencies can be used directly, as they have been in the case of a few orchard pests; but until the natural effect of these factors is understood, we have a very inadequate basis upon which to plan a control campaign against the barkbeetle. Along with this program the tree itself must also be studied to determine the characters most likely to invite or repel insect attack. Work has already been started along this line by the Bureau of Entomology, but with very limited personnel and financial resources.

In working to improve control methods, the most effective progress can be made through recourse to experimental control projects. Any development that will make direct control less expensive or more effective will add just so much to the profit of protective work. So far, the strategy of the offensive against the beetles has been a direct attack--an effort to break down their numbers by the saw, ax, ax and fire methods. This system can get the barkbeetle down, but not to stay down. Although weakened for a year or two by a control drive, the insects have shown that they are able to collect their forces and come back with a counter-offensive to recover the lost territory. It may be possible to find a short cut--some method entirely different from any that have been developed up to the present. We can at least look for some weak spot in the

behavior and instinctive reactions of the beetle that man can use to his own advantage. After some years of experiments entomologists finally found a chemical that specifically attracted the Japanese beetle, and succeeded in producing a concentration of its numbers at certain points where it could be easily destroyed. Apparently some such method would be readily adaptable to the western pine beetle, which possesses a strong natural tendency to concentrate its numbers wherever a few individuals of its kind start an attack on a living tree. There is a field of possibilities here in which the chemist and entomologist can join forces in experimental work.

The western pine beetle is but one of a number of forest insects that are a menace to the forest resources of the West. We have confined the discussion to this species because it presents a typical problem and because it has recently become of considerable concern to private timber owners. The mountain pine beetle in the lodgepole forests of Montana and Idaho furnishes probably one of the most important barkbeetle situations confronting the protection of national forest timber. Scientists now tell us that the warfare between men and insects, both competing for the same plant foods, will become keener in the future. This seems to be true with certain forest pests. We may expect the ingenuity of man to win if he considers the forest values high enough to concentrate his resources upon the problem. At least in our western yellow pine stands we are not yet ready to concede the field to the barkbeetle. There is good reason to believe that man and not the barkbeetle can ultimately harvest the last reserves of virgin timber, but we cannot expect the existing stands to await indefinitely the coming of the sawmill without giving thought and action to their protection against insects. A well-

financed research program is perhaps the greatest need in bringing this phase of protection to the point where it can compare in effectiveness with fire protection. Experimental work requires time, intelligence and devotion on the part of the scientist, but also funds to work out the application of new conceptions of methods.